



Workshop on future muon EDM searches at Fermilab and worldwide

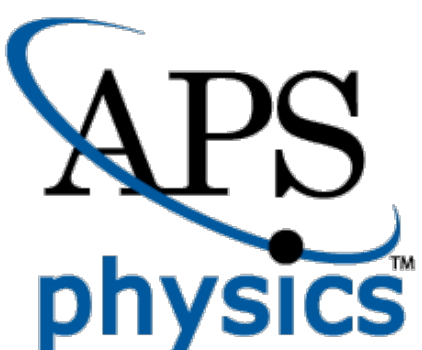
Welcome and Introduction

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University of Washington

Themis Bowcock
University of Liverpool

This workshop is sponsored by

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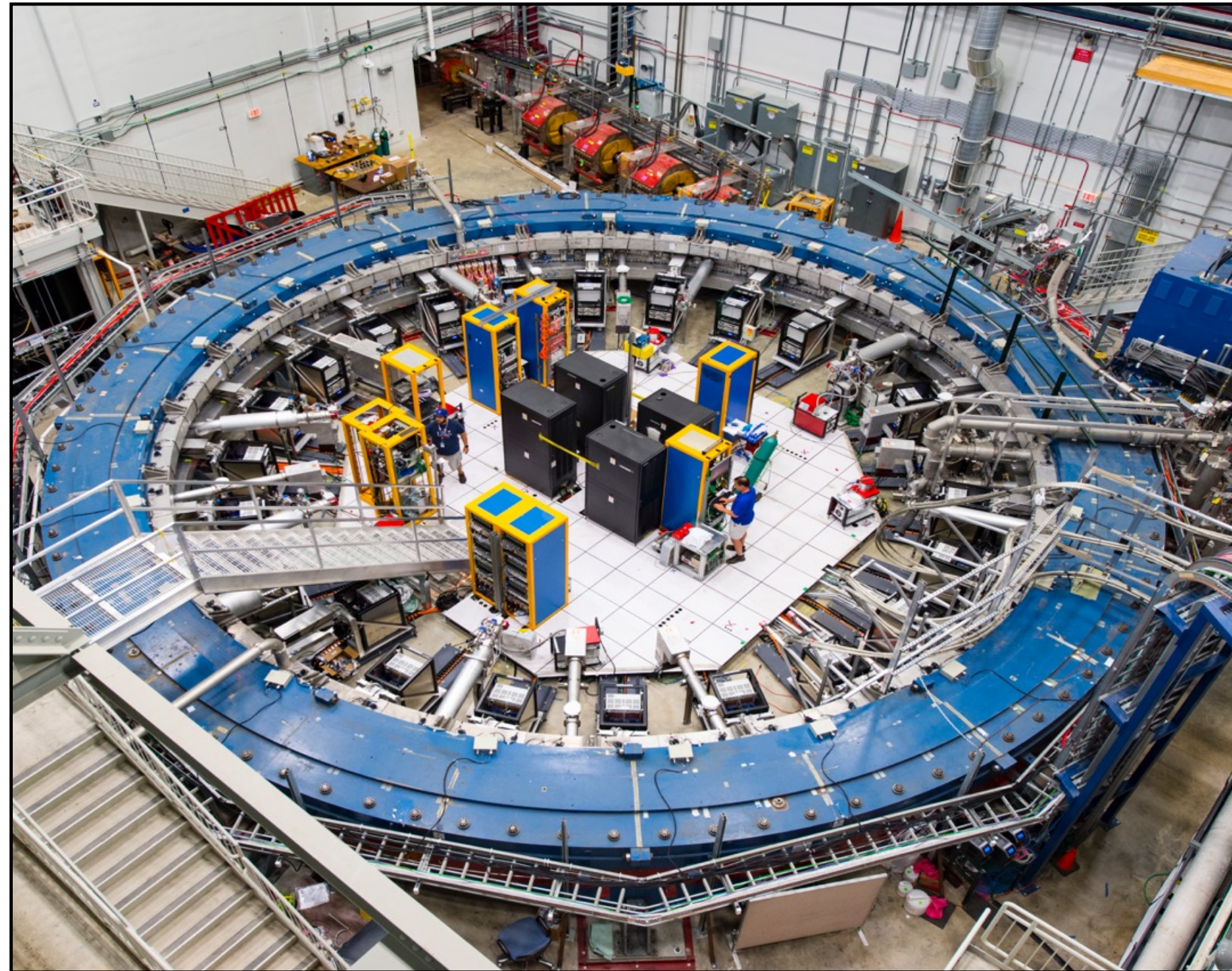


What is this workshop about?

- From Moore Foundation and APS: *“Visitor Awards promote collaboration and exchange of ideas among researchers who may not otherwise have the opportunity to work closely together.”*
 - bring together expertise of Fermilab Muon g-2, tracking detectors (Liverpool, Mu3e), mEDM (J-PARC, PSI) and mEDM theorists
- *A working workshop* to investigate an upgrade plan discussed at Fermilab for a muon electric dipole moment search after 2020
 - not limited to Fermilab Muon g-2 community, new collaborators welcome!
- Encourage early career physicists to work together planning for future experiments - Becky, Joe, Kim Siang, Saskia (all Muon g-2), Mikio (ETHZ) and more.
 - this potential experiment is still several years down the road

Muon g-2 storage ring + MuPix ?

Muon g-2 experiment at Fermilab



*24 calorimeters
2 tracking stations*

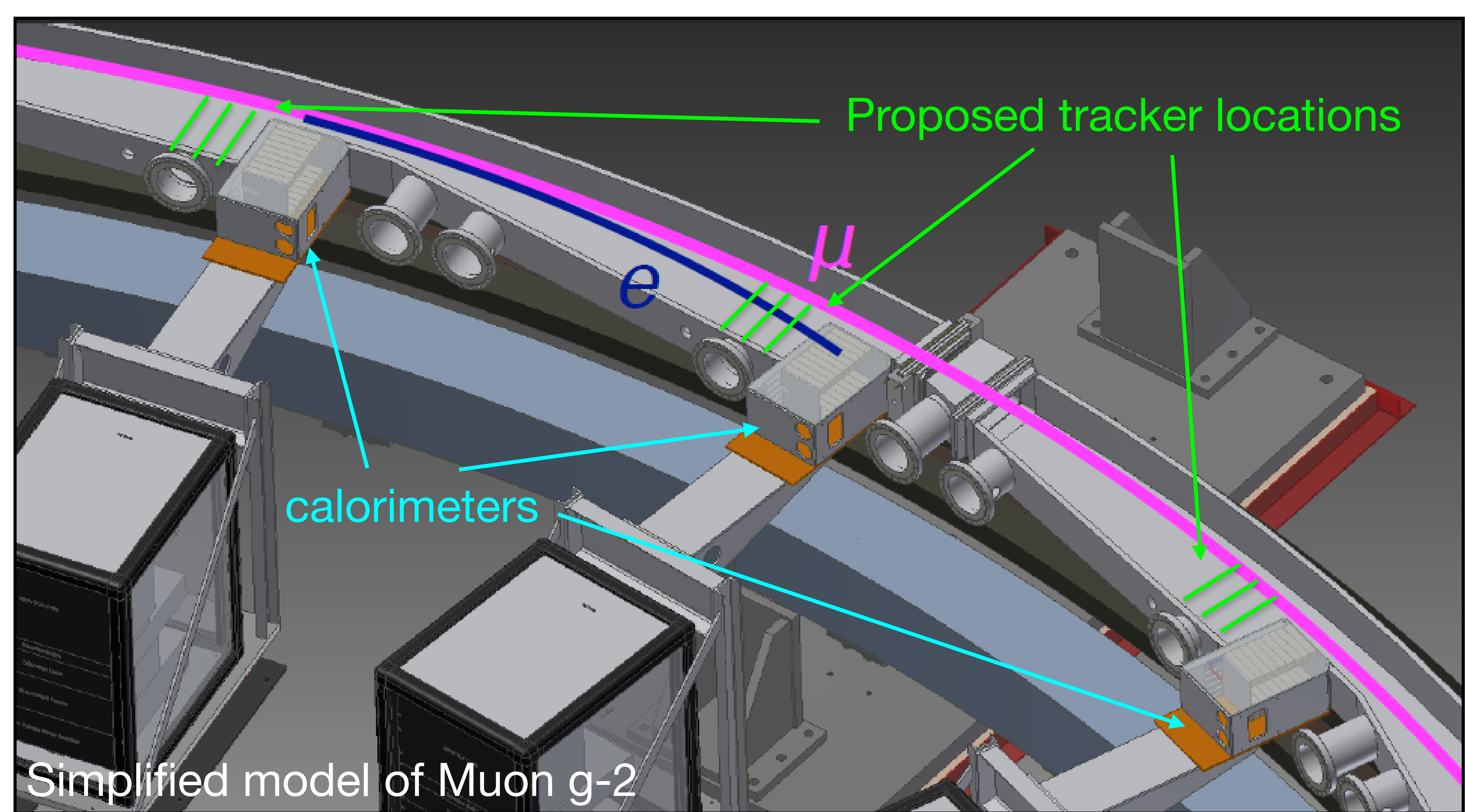
MuPix test beam at Mainz (Aug 2018)



courtesy Niklaus Berger

*Mu3e Picture Gallery
<https://www.psi.ch/mu3e/photos>*

why not 24 x (calorimeter + compact tracking) stations for muon EDM search ???



And the format of the workshop?

- It's a 2-week long workshop
 - special theme each day (status, hardware, DAQ, simulation, analysis)
 - slightly different group of people will join each day (remotely)
 - 70% reserved for actual work (documentation, coding, analysis, report) and lab visits (fabrication and assembly of pixel detectors)
 - deliverables: **workshop report** (cost, human resource, technical challenges, timeline for prototype & production) and **simulation & analysis codes** (add-on to gm2ringsim)
 - plus lots of coffee breaks: coffee = productivity
- A mini-workshop on muon EDM worldwide on the last day
 - new theoretical motivations for the muon EDM search
 - status update from J-PARC and a new initiative at PSI

Workshop agenda

Monday, October 1, 2018		
09:00	Welcome and Introduction (15')	Kim Siang Khaw (University of Washington) ▼
09:15	Introduction to Particle Physics at Liverpool (25')	Themis Bowcock (University of Liverpool) ▼
09:40	Introduction to MDM and EDM (40')	Thomas Teubner (University of Liverpool) ▼
10:20	Coffee break (20')	
10:40	Future muon EDM searches (FNAL, J-PARC and PSI) (30')	Kim Siang Khaw (University of Washington) ▼
11:10	Muon EDM limits from BNL (40')	Rebecca Chislett (UCL) ▼
11:50	Projected muon EDM sensitivity at FNAL and future plan (40')	Joe Price (Univ. of Liverpool) ▼
12:30	Lunch break (1h30')	
14:00	Lab visit and discussion (3h0')	

Tuesday, October 2, 2018		
09:45	Introduction to silicon trackers and the LHCb Vertex Locator (VELO) (1h0')	Themis Bowcock (University of Liverpool) ▼
10:45	Coffee break (20')	
11:05	Silicon tracker for Mu3e@PSI (Readout and DAQ for MuPix) (40')	Niklaus Berger (Johannes Gutenberg University Mainz) ▼
11:45	Production and assembly for MuPix detectors (40')	Joost Vossebeld (University of Liverpool) ▼
12:25	Lunch break (1h35')	
14:00	Intro to Muon g-2 DAQ and tracker readout and DAQ (40')	Rebecca Chislett ▼
14:40	Readout and DAQ needs (1h30')	
16:10	Coffee break and discussion (50')	

Wednesday, October 3, 2018		
09:00	Production, testing (QA&QC) and commissioning of Si detectors (1h30')	
10:30	Coffee break (20')	
10:50	Production, testing (QA&QC) and commissioning of Si detectors (1h30')	
12:20	Lunch break (1h40')	
14:00	Production, testing (QA&QC) and commissioning of Si detectors (2h0')	
16:00	Coffee break and discussion (1h0')	

Thursday, October 4, 2018		
09:00	Lab visit and discussion (3h0')	
12:00	Lunch break (2h0')	
14:00	Current simulation for Muon g-2/EDM at FNAL (40')	Saskia Charity ▼
14:40	Current tracking analysis for Muon g-2/EDM at FNAL (40')	Joe Price (Univ. of Liverpool) ▼
15:20	Coffee break (20')	
15:40	Selected tracking analysis for LHCb (40')	▼
16:20	Selected tracking analysis for Mu3e (40')	▼

Friday, October 5, 2018		
09:00	Simulation and analysis needs (1h30')	
10:30	Coffee break (20')	
10:50	Simulation and analysis needs (1h30')	
12:20	Lunch break (1h40')	
15:00	Summary of week 1 and study list for next week (1h0')	Kim Siang Khaw (University of Washington) ▼
Summary of hardware and software needs based on discussions in week 1 and action items for week 2.		

Monday, October 8, 2018		
09:00	Simulation, analysis and report compilation (8h0')	

Tuesday, October 9, 2018		
09:00	Simulation, analysis and report compilation (8h0')	

Wednesday, October 10, 2018		
09:00	Simulation, analysis and report compilation (8h0')	

Thursday, October 11, 2018		
15:00	Workshop report presentation (30')	Kim Siang Khaw (University of Washington) ▼
15:30	Report discussion (1h0')	
16:30	Coffee break (20')	

Friday, October 12, 2018		
09:00	Introduction to this session (15')	Kim Siang Khaw (University of Washington) ▼
09:15	Updates from J-PARC Muon g-2/EDM (40')	Tsutomu Mibe (KEK) ▼
09:55	Combined explanations of (g−2) _{μ,e} and implications for a large muon EDM (40')	Andreas Crivellin (PSI) ▼
10:35	Coffee break (20')	
10:55	A model-independent analysis of the electron/muon EDM (40')	Emilie Passemar Martin Jung ▼
11:35	Muon EDM search at PSI using frozen spin technique (40')	Philipp Schmidt-Wellenburg (Paul Scherrer Institute) ▼
12:15	Lunch break (1h45')	
14:00	Theoretical motivations for a large muon EDM (1h30')	
15:30	Coffee break (20')	
15:50	Possible collaborations for the future muon EDM search at FNAL and frozen spin technique muon EDM search at PSI (1h10')	

breaks/work/discussions